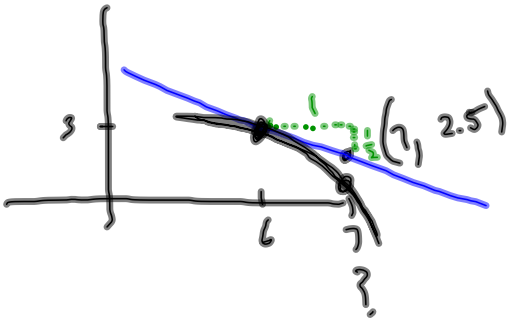
9. f'' exists no infl. pts

$f(6)=3 \quad f'(6)=-\frac{1}{2} \quad f''(6)=-2$

Concave down

$f(7)$



$f(7) < 2.5$

Apr 1-7:40 AM

10. $1+\frac{x^2}{2!}+\frac{x^4}{4!}+\frac{x^6}{6!}\cdots\frac{x^{2n}}{(2n)!}$

~~$\cos x$~~

$e^x + \sin x \qquad 1+x+\frac{x^2}{2!}+\frac{x^3}{3!}\cdots+\left(x-\frac{x^3}{3!}+\frac{x^5}{5!}\right.$

~~e^{x^2}~~ $= 1+x^2+\frac{x^4}{2!}+\frac{x^6}{3!}\cdots$

$\frac{1}{2}(e^x+e^{-x})$

$e^x \quad 1+x+\frac{x^2}{2}+\frac{x^3}{3!}\cdots$

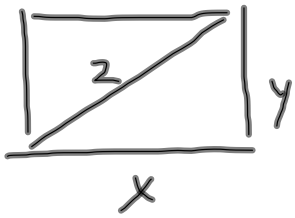
$e^{-x} \quad 1-x+\frac{x^2}{2}-\frac{x^3}{3!}\cdots$

$+$

$2+2\cdot\frac{x^2}{2}+2\frac{x^4}{4!}\cdots$

Apr 1-7:50 AM

11.



$x = 4$ $\quad z = 5$
$y = 3$

$\frac{dx}{dt} = \frac{dz}{dt}$

$x^2 + y^2 = z^2$

$\frac{dy}{dt} = k\frac{dz}{dt}$

$2x\frac{dx}{dt} + 2y\frac{dy}{dt} = 2z\frac{dz}{dt}$

$4\frac{dz}{dt} + 3k\frac{dz}{dt} = 5\frac{dz}{dt}$

$4 + 3k = 5$

$k = \frac{1}{3}$

Apr 1-9:29 AM

12.

$f'(x) = \frac{2}{x}$ $\quad f(\sqrt{e}) = 5$ $\quad f(e) = ?$

definite integral

$f(e) = 5 + \int_{\sqrt{e}}^{e} \frac{2}{x}\,dx$

$= 5 + 2\ln x \Big|_{\sqrt{e}}^{e}$

$= 5 + 2\ln e - 2\ln\sqrt{e}$

$5 + 2 - 2\ln e^{\frac{1}{2}}$

$5 + 2 - 2\,\frac{1}{2}\ln e$

$5 + 2 - 1 = \boxed{6}$

Apr 1-7:55 AM

$f'(x) = \frac{2}{x}$ indefinite integral

$f(x) = \int \frac{2}{x}\,dx = 2\ln x + C$

ic $5 = 2\ln\sqrt{e} + C$

$5 = 2\ln e^{\frac{1}{2}} + C$

$5 = 1 + C$

$C = 4$

$f(x) = 2\ln x + 4$

$f(e) = 2\ln e + 4 = \boxed{6}$

Apr 1-8:00 AM

Review 20 Methods of Integration

1. Memorize basic formulas
2. Substitution let u = inside of composite or u = denom.
3. integration by parts $\int u\,dv = uv - \int v\,du$

use with $\int$ product let u = L I P E T (or tabular)

4 partial fractions

$\int \frac{1}{(x-2)(x+1)}\,dx = \int \frac{A}{x-2} + \frac{B}{x+1}$

find A, B with cover up

Apr 1-8:06 AM

$\int 4x(x^2+5)^8\,dx$ let $u = x^2+5$

$du = 2x\,dx$

$\frac{du}{2x} = dx$

$\int 4x \cdot u^8 \frac{du}{2x}$

$2\int u^8\,du = 2 \cdot \frac{u^9}{9} + C$

$= \frac{2}{9}(x^2+5)^9 + C$

Apr 1-8:14 AM

$\int 5^x x\,dx$ $u = x$ $du = dx$

$dv = 5^x dx$ $v = \frac{5^x}{\ln 5}$

$= \frac{x \cdot 5^x}{\ln 5} - \int \frac{5^x}{\ln 5}\,dx$ $\frac{1}{\ln 5}\int 5^x\,dx$

$= \frac{x \cdot 5^x}{\ln 5} - \frac{5^x}{(\ln 5)^2} + C$ $\frac{1}{\ln 5} \cdot \frac{5^x}{\ln 5}$

tabular

x	5^x	
1	$\frac{5^x}{\ln 5}$	
0	$\frac{5^x}{(\ln 5)^2}$	

Apr 1-8:19 AM

14. $\int \frac{8}{x^2-4}\,dx = \int \frac{8}{(x-2)(x+2)}\,dx$

$= \int \frac{A}{x-2} + \frac{B}{x+2}\,dx$

$A = \frac{8}{(2-2)(2+2)} = 2 \qquad B = \frac{8}{(-2-2)(-2+2)} = -2$

$\int \frac{2}{x-2} - \frac{2}{x+2}\,dx$

$2\ln|x-2| - 2\ln|x+2| + C$

$2\ln\left|\frac{x-2}{x+2}\right| + C$

Apr 1-8:25 AM